APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,212	04/21/2004	Qiming Li	19.0405	3211

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EXAMINER
WHITTINGTON, KENNETH

ART UNIT	PAPER NUMBER
2862	

MAIL DATE	DELIVERY MODE
10/15/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/709,212	LI ET AL.
	Examiner	Art Unit	
	Kenneth J. Whittington	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>05 September 2007</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-71</u> is/are pending in the application.

    4a) Of the above claim(s) <u>40-71</u> is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-18</u> is/are rejected.

7)☒ Claim(s) <u>19-39</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>17 May 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

The Request for Reconsideration filed September 5, 2007 has

been entered and considered.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not

7   included in this action can be found in a prior Office action.

Claims 1-8 and 10-18 are rejected under 35 U.S.C. 102(e) as

being anticipated by Fanini (US2004/0100263). Regarding claim

1, Fanini discloses method and apparatus comprising:

disposing within a borehole a logging instrument equipped

with at least first transmitter and receiver antennas spaced

apart by a first distance, at least one of the first antennas

14 having a tilted magnetic dipole with respect to the longitudinal

axis of the instrument, the antennas being oriented about the

axis of the logging instrument such that the at least one tilted

magnetic dipole corresponds to a first azimuthal angle (See

Fanini FIG. 1 and see paragraphs 0018, 0019 and 0044-0056, note

there are a plurality of multi-component sensors comprising

transmitters and receivers oriented at the x, y and z

21 directions);

azimuthally-rotating the logging instrument within the

borehole and while the logging instrument is rotating,

activating the first transmitter antenna to transmit

electromagnetic energy into the formation; while the logging

instrument is rotating (See paragraphs 0062-0077),

directionally measuring the first voltage signals

associated with the transmitted electromagnetic energy using the

first receiver antenna, as a function of the azimuthal

orientation of the logging instrument, so as to determine the

azimuthal variation of the measured first voltage signals (See

paragraph 0056-0077); and

fitting the azimuthal variation of the measured first

voltage signals to approximate functions (See paragraphs 0067-

0077).

Regarding claim 2, the fitting step is executed while the

first voltage signals are being measured (See paragraphs 0064-

0078, note that the data is fit for each azimuthal sector which

is used to geo-steer, which would require real time calculations

for steering).

Regarding claim 3, the fitting is stopped when convergence

has been achieved (See paragraphs 0064-0077).

Regarding claim 4, the activating, measuring, and fitting

steps are repeated to execute subsequent acquisition cycles (See

paragraphs 0064-0078, note steps are repeated for each sector).

Regarding claims 5 and 6, the fitting functions are sinusoids defined by coupling components of the first transmitter antenna's magnetic dipole and first receiver antenna's orientation vectors and the coefficients of the fitting components are functions of earth formation parameters including at least one of resistivity of formation beds, location of the logging instrument, borehole deviation, azimuth angle at the location of the logging instrument, and a combination thereof (See paragraph 0056-0077).

Regarding claim 7, the fitting coefficients include constant, sine, cosine, double angle sin and double angle cosine terms that define an iterative fitting algorithm useful for determining the azimuthal dependence of the directional measurements (See paragraph 0056).

Regarding claim 8, the iterative fitting algorithm is used for selected real-time directional measurements having utility in geo-steering (See paragraphs 0064-0078).

Regarding claim 10, Li discloses the logging instrument is further equipped with second transmitter antenna and receiver antennas spaced apart by the first distance, the second transmitter having a magnetic dipole whose tilt corresponds to the tilt of the first receiver antenna and the second receiver antenna having a magnetic dipole whose tilt corresponds to the

tilt of the first transmitter antenna such that at least one of

the second antennas has a tilted magnetic dipole, the second

transmitter and receiver antennas being oriented about the axis

of the logging instrument such that the at least one tilted

magnetic dipole corresponds to a second azimuthal angle, and

further comprising the steps of (See Fanini FIG. 1 and see

7   paragraphs 0018, 0019 and 0044-0056, note there are a plurality

of multi-component sensors comprising transmitters and receivers

oriented at the x, y and z directions):

while the logging instrument is rotating, activating the

second transmitter antenna to transmit electromagnetic energy

into the formation (See paragraphs 0062-0077);

while the logging instrument is rotating, directionally

14   measuring the second voltage signals associated with the

transmitted electromagnetic energy using the second receiver

antenna, as a function of the azimuthal orientation of the

logging instrument, so as to determine the azimuthal variation

of the measured second voltage signals (See paragraph 0056-

0077);

fitting the azimuthal variation of the measured second

21   voltage signals from the second receiver to approximate

functions (See paragraphs 0067-0077).

Regarding claims 11 and 12, Li discloses the second azimuthal angle differs from the first azimuthal angle by substantially 90 degrees (See Fanini FIG. 1 and see paragraphs 0018, 0019 and 0044-0056, note there are a plurality of multi-component sensors comprising transmitters and receivers oriented at the x, y and z directions, note that the sensors are three axis transmitters and receivers at orthogonal axis, x, y and z, thus the first and second angles can be chosen to be 90 degrees relative to the tool axis, i.e., the x and y axes).

Regarding claim 13, Li discloses the fitting step is executed while the second voltage signals are being measured (See paragraphs 0067-0077).

Regarding claim 14, Li discloses the step of stopping the fitting when convergence criterion has been achieved (See paragraphs 0067-0077).

Regarding claim 15, Li discloses the activating, measuring, and fitting steps are repeated to execute subsequent acquisition cycles (See paragraphs 0064-0078, note steps are repeated for each sector).

Regarding claim 16, Li discloses the fitting functions are sinusoids defined by coupling components of the first transmitter antenna's magnetic dipoles and first receiver antenna's orientation vectors, and by coupling components of the

second transmitter antenna's magnetic dipoles and second

receiver antenna's orientation vectors (See paragraph 0056-

0077).

Regarding claim 17, Li discloses the coefficients of the

fitting components are functions of earth formation parameters

such as resistivity of formation beds, location of the logging

instrument, borehole deviation, and azimuth angle at the

location of the logging instrument (See paragraph 0056-0077).

Regarding claim 18, Li discloses the fitting coefficients

include constant, sine, cosine, double angle sin and double

angle cosine terms that define an iterative fitting algorithm

useful for determining the azimuthal dependence of the

directional measurements (See paragraph 0056).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not

included in this action can be found in a prior Office action.

Claim 9 is rejected under 35 U.S.C. 103(a) as being

unpatentable over Fanini in view of Minerbo et al. (US

6,304,086), hereinafter Minerbo. Regarding this claim, Fanini

teaches the features noted above except for the use of a Fourier

transform. Minerbo teaches use of a Fourier transform in

induction logging applications (See Minerbo col. 5, line 57 to

col. 15, line 38). It would have been obvious to use a Fourier

transform in the processing of Fanini. One having ordinary

skill in the art would have been motivated to do so to reduce

the complexity of equations to a usable form as noted by Minerbo

at col. 7, lines 45-49 and further it is well known in the art

to use a Fourier transform to derive a set of equations with

coefficients representing desired characteristics.

Allowable Subject Matter

Claims 19-39 are objected to as being dependent upon a

rejected base claim, but would be allowable if rewritten in

independent form including all of the limitations of the base

claim and any intervening claims.

Regarding claims 19, 20, 24, 25 and 28, the prior art does

not show or teach calculating the phase shift and attenuation

and the calculating as recited in the claims and in combination

with the other features of the claims.

Regarding claims 21-23, the prior art does not show or

teach characterizing the noise as recited in the claims and in

combination with the other features of the claims.

Regarding claims 26 and 27, the prior art does not show or

teach determining the constant and first harmonic coefficients

as recited in the claims and in combination with the other features of the claims.

Regarding claims 29-39, the prior art does not show or teach the particular iterative fitting algorithm as recited in the claims and in combination with the other features of the claims.

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Response to Arguments

Applicant's arguments filed September 5, 2007 have been fully considered but they are not persuasive.

The only argument asserted by Applicants is that the Fanini does not discloses tilted coils as recited in the claims. As defined in Websters New College Dictionary (1999 Houghtin 14 Mifflin Co.), tilt is a deviation from the horizontal or vertical. It does not have provide limits on this deviation. Thus, tilt can be interpreted to means any angle between 0 and 180 degrees from the note axis.

The specification, drawings and claims or the specific portion thereof cited by Applicants (paragraph 0012) of the present application further do not provide a specific definition 21 of tilt foreclosing the interpretation of tilt as being perpendicular or transverse to a given axis.

With regard to Fanini, its antennas are tilted at an angle

of 90 degrees to the tool axis. Accordingly, Fanini teaches the

coils or antennas tilted in the manner recited in the claims.

The fact that Fanini does not use the word tilt with regard to

its antennas does not foreclose the interpretation the antennas

are tilted.

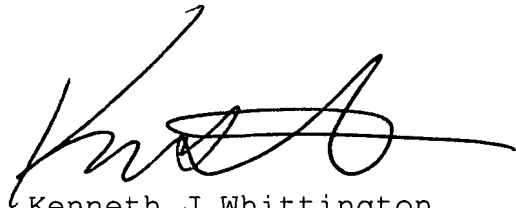7   For the forgoing reasons, the rejections stand.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the

extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action

is set to expire THREE MONTHS from the mailing date of this

14   action. In the event a first reply is filed within TWO MONTHS

of the mailing date of this final action and the advisory action

is not mailed until after the end of the THREE-MONTH shortened

statutory period, then the shortened statutory period will

expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated

from the mailing date of the advisory action. In no event,

21   however, will the statutory period for reply expire later than

SIX MONTHS from the mailing date of this final action.

    Any inquiry concerning this communication or earlier

communications from the examiner should be directed to Kenneth

J. Whittington whose telephone number is (571) 272-2264. The

examiner can normally be reached on Monday-Friday, 7:30am-
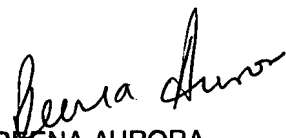
4:00pm.

    If attempts to reach the examiner by telephone are

7 unsuccessful, the examiner's supervisor, Patrick Assouad can be

reached on (571) 272-2210. The fax phone number for the

organization where this application or proceeding is assigned is

571-273-8300.

Kenneth J Whittington
Examiner
Art Unit 2862

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kjw

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PRIMARY EXAMINER
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